APPENDIX A
SUPPORTING DATA

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SUPPORTING DATA

Copies of the following geotechnical data developed for the BHP Port Cabrillo Project are included in the appendix to this report:

- Log of Boring and Test Results, Boring DH-1 — Plate A-1a and A-1b
- Composite Vibracore Log — Plate A-2
- Key to Terms and Symbols Used on Logs — Plate A-3
- Descriptions of Drop Core and Grab Samples — Plate A-4
- Grain Size Curves — Plate A-5

04/21/2005 09:43

PROJECT NO: 3390.002
BORING: DH-1

START DATE: 2/25/2005
COMPLETION DATE: 2/26/2005

DRILLER: Fugro Geosciences
DRILLING METHOD: Mud Rotary Wash

Coordinates: N 3,778,161 E 300,969
UTM Zone 11, NAD83, meters

SURFACE ELEVATION: 2.7 0.0 m +/- (rel. MLLW datum)

ELEVATION, m	DEPTH, m	SAMPLE NO.	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION
					ARTIFICIAL FILL (af) 0.3m
2	1	1		(12)	Silty SAND with gravel (SM): loose to medium dense, dark yellowish brown, moist
					ALLUVIUM (Qal)
1	2	2		(13)	Silty Fine SAND (SM): loose, dark yellowish brown, moist - olive gray, wet, fine to medium sand, at 1.8m (6')
0	3	3		15	- medium dense, at 2.7m (9')
-1	4	4		27	3.7m SAND with silt (SP-SM): medium dense, olive gray, wet, fine to medium sand, slightly micaceous
-2	5	5		22	
-3	6	6		(8)	6.1m Fat CLAY (CH) interbedded with SAND with Silt (SP-SM): medium stiff clay, loose sand, olive gray, wet, abundant clay pockets and partings
-4	7	7		22	7.0m SAND with silt and gravel (SP-SM): medium dense, olive gray, wet, micaceous, with shell fragments, subrounded coarse gravel up to 38mm (1.5") diameter
-5	8				
-6	9	8		(54)	9.1m Silty SAND (SM): dense, olive gray, wet, micaceous, fine to medium sand
-7	10				
-8	11	9		27	- medium dense, fine sand, below 10.7m (35')
-9	12	10		(52)	- dense, below 12.2m (40')
-10	13				
-11	14	11		38	- black nodule, at 13.8m (45.3')
-12	15				
-13	16	12		(73)	
-14	17	13		35	
-15	18				18.3m
-16	19	14		(53)	Grades to SILT (ML): dense, olive gray, wet, micaceous, with black inclusions, trace clay pockets
-17					19.8m
-18	20	15		55	Silty Fine SAND (SM): very dense, olive gray, wet, micaceous, with shell fragments
-19	21	16		(66)	21.3m SILT (ML): dense, olive gray, wet, with fine sand and shell fragments - with shell fragments, 21.3m to 27.4m (70' to 90')
-20	22				22.9m
-21	23	17		46	Silty Fine SAND (SM): dense, olive gray, wet - with shell fragments, 22.9m to 27.4m (75' to 90')
-22	24	18		(85)	- very dense, with silt pockets, at 24.4m (80') - with 76mm to 102mm (3" to 4")-thick sandy silt lens, at 24.4m (80.2')
-23	25				
-24	26				
-25	27	19		47	27.4m Sandy SILT (ML): dense, olive gray, wet
-26	28				
-27	29				
-28	30	20		(94|28c)	30.5m SAND with silt (SP-SM): very dense, olive gray, wet - with 76mm to 102mm (3" to 4")-thick thick lean clay seam with black organics, at 30.6m (100.3')
-29	31				
-30	32				
-31	33	21		WOR	33.5m Fat CLAY (CH): very soft, olive gray, wet, with black inclusions, silt and sand partings - Driller noted subsurface materials seem to alternate between soft and hard materials between 33.8m and 35.1m (111' and 115') based on drilling conditions.
-32	34				
-33	35	22		PUSH	35.1m Silty, Clayey SAND (SC-SM): olive gray, wet 35.4m
-34	36				Silty SAND (SM): dense to very dense, olive gray, wet, micaceous, fine to medium sand
-35	37	23		(99|25c)	- very dense, fine to medium sand with silt pockets, at 36.6m (120')
-36	38	24		85	- with clay partings, at 38.1m (125') 38.3m
-37	39				SILT (ML): very dense, olive gray, wet, micaceous - with black laminations and clay partings, at 38.3m (125.6')
-38	40				
-39	41				
	42				

ID TESTS/RQD/RECOVERY(%)
20 40 60 80

KCF kN/m³ SUBMERGED UNIT WEIGHT
0.045 0.051 0.057 0.064
7.0 8.0 9.0 10.0

KSF kPa SOIL UNDRAINED SHEAR STRENGTH
2.1 4.2 6.3 8.4
100 200 300 400

CPT INTERVAL

The log and data presented are a simplification of actual conditions encountered at the time of sampling at the sample location. Subsurface conditions may differ at other locations and with the passage of time.

For symbol identification, refer to Key to Terms & Symbols Used on Logs.

LOG OF BORING AND TEST RESULTS

BORING DH-1

BHP Cabrillo Port HDD Shore Crossing Project
Ventura County, California

PLATE A-1a

04/21/2005 09:43

PROJECT NO: 3390.002
BORING: DH-1

START DATE: 2/25/2005
COMPLETION DATE: 2/26/2005

DRILLER: Fugro Geosciences
DRILLING METHOD: Mud Rotary Wash

Coordinates: N 3,778,161 E 300,969
UTM Zone 11, NAD83, meters

MATERIAL DESCRIPTION

SURFACE ELEVATION: 2.7 0.0 m +/- (rel. MLLW datum)

- medium dense, with black inclusions, at 42.7m (140') — 43.0m

Silty Fine SAND (SM): medium dense, olive gray, wet, micaceous, with silty lenses

47.2m

Fine Sandy SILT (ML): dense, olive gray, wet
- with clay pockets, at 47.2m (155')
- with wood fragment, at 47.5m (156')

- very dense, at 51.8m (170')

- dense, with black inclusions, at 56.4m (185')
- with fine light gray sand pockets, trace black organics, 56.4m to 56.5m (185' to 185.5')
- with 76mm (3")- thick sandy clay seam, at 56.7m (186')

57.9m

SAND (SP): very dense, light olive gray, wet, trace fine to coarse, subrounded gravel up to 38mm (1.5") diameter, micaceous, fine to medium sand
- very hard drilling (rig chatter) at 57.9m to 61m (190' to 200')
- with fine gravel-size rock and shell fragments in cuttings, at 59.4m (195')

- with sandy silt pockets, at 61m (200')

Notes:
Boring caved overnight from about 36.6m to 6.1m (120' to 20') after completion of drilling on February 25, 2005.
Boring caved to about 18.3m (60') after pulling drill pipe at 61m (200') for grouting on February 26, 2005.

TD = 61.1m

SAMPLE NO.	SAMPLER	BLOW COUNT
25a		(40)
25b		0
26		40
27		(50|8c)
28		48
29	GRAB	
30		(Ref.)

ID TESTS/RQD/RECOVERY(%): 20, 40, 60, 80

KCF kN/m³ — SUBMERGED UNIT WEIGHT: 0.045, 0.051, 0.057, 0.064 | 7.0, 8.0, 9.0, 10.0

KSF kPa — SOIL UNDRAINED SHEAR STRENGTH: 2.1, 4.2, 6.3, 8.4 | 100, 200, 300, 400

669

CPT INTERVAL

PLATE A-1b

The log and data presented are a simplification of actual conditions encountered at the time of sampling at the sample location. Subsurface conditions may differ at other locations and with the passage of time.

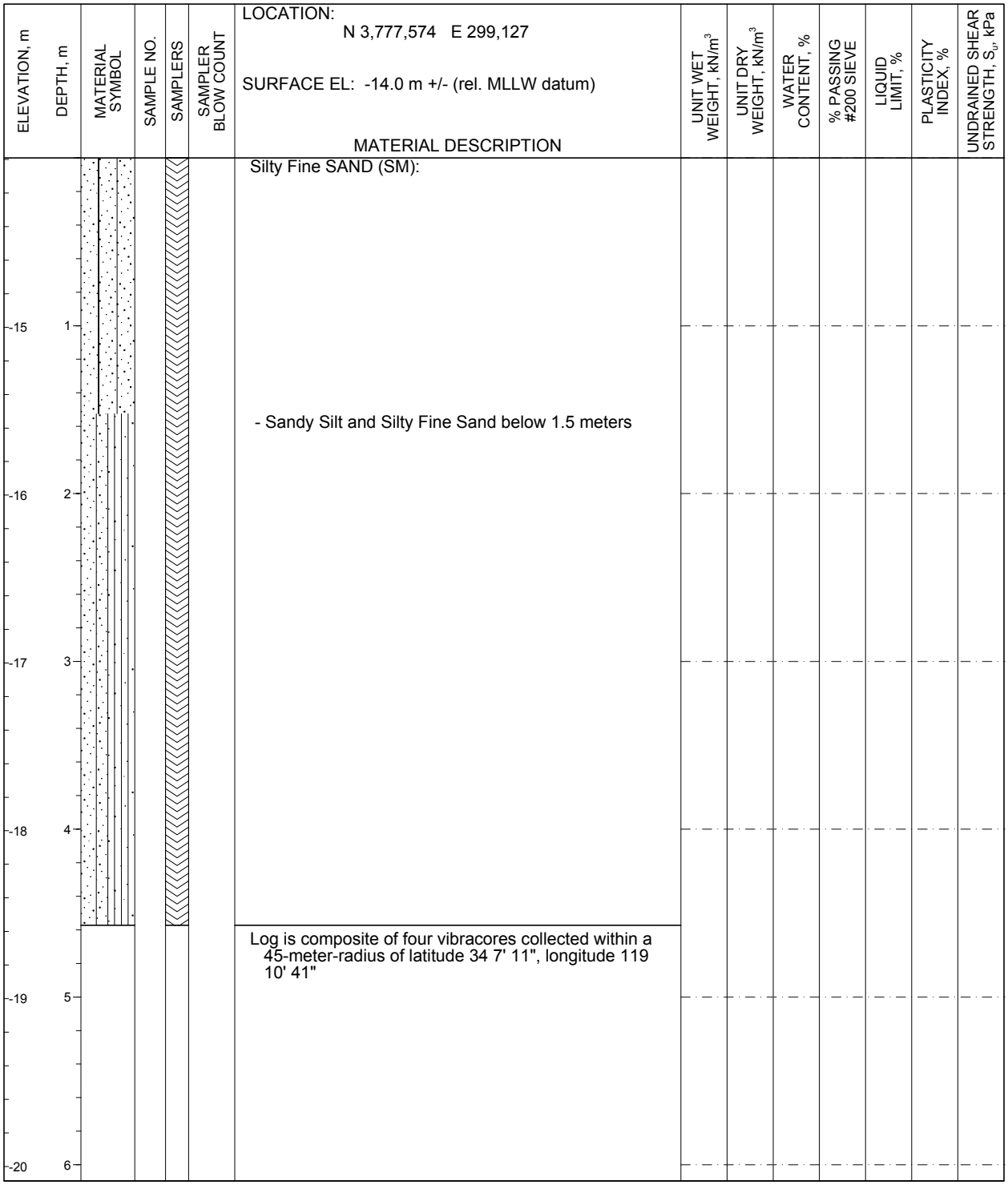
For symbol identification, refer to Key to Terms & Symbols Used on Logs.

LOG OF BORING AND TEST RESULTS

BORING DH-1

BHP Cabrillo Port HDD Shore Crossing Project
Ventura County, California

FUGRO



The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

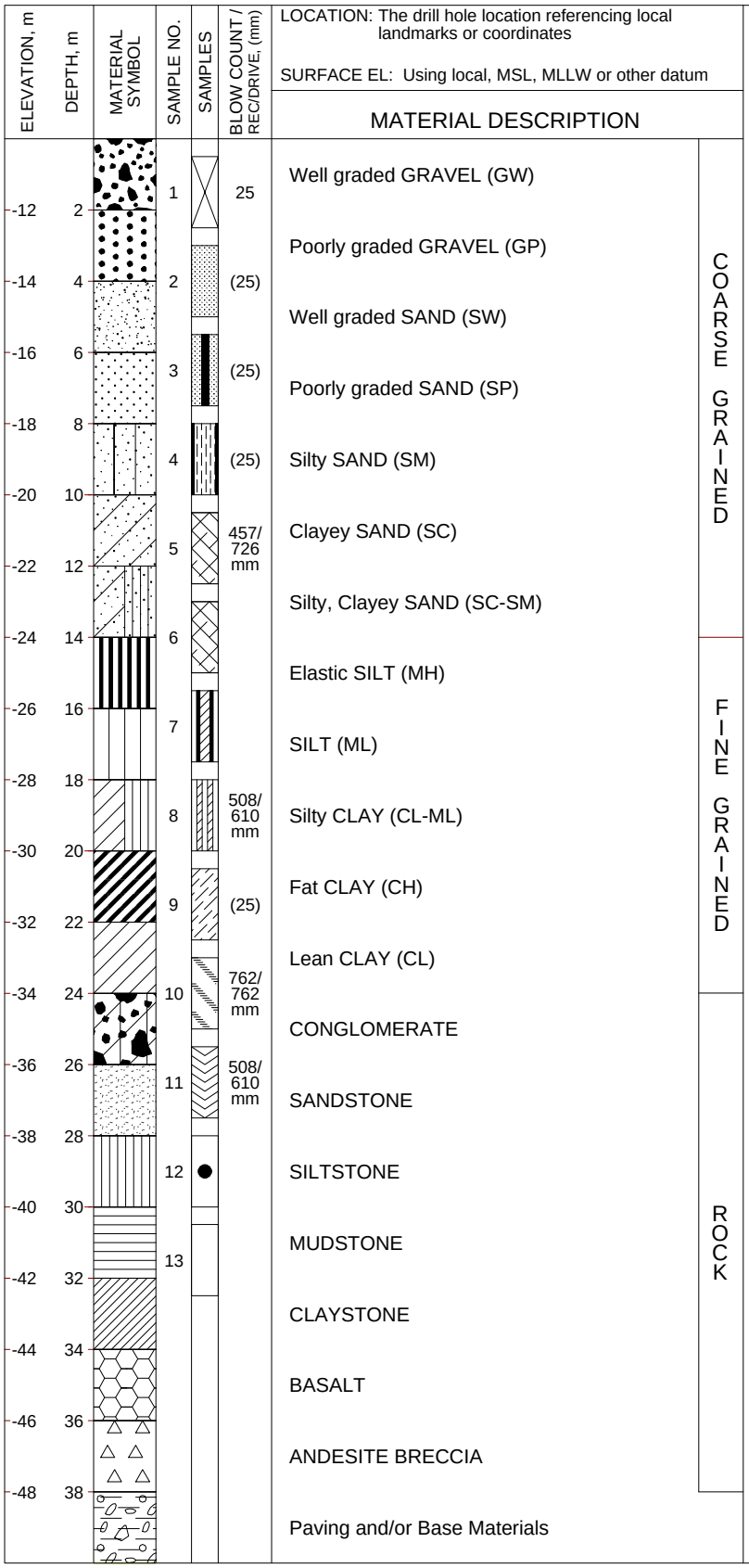
COMPLETION DEPTH: 4.6 m

DRILLING DATE: September 10, 2003

COMPOSITE VIBRACORE LOG

BHP Cabrillo Port HDD Shore Crossing Project
Oxnard, California

PLATE A-2



General Notes

Soil Texture Symbol

Sloped line in symbol column indicates transitional boundary

Samplers and sampler dimensions (unless otherwise noted in report text) are as follows:

Symbol for:

1	SPT Sampler, driven 34.9 mm ID, 50.8 mm OD
2	CA Liner Sampler, driven 60.3 mm ID, 76.2 mm OD
3	CA Liner Sampler, disturbed 60.3 mm ID, 76.2 mm OD
4	Thin-walled Tube, pushed 73.0 mm ID, 76.2 mm OD
5	Bulk Bag Sample (from cuttings)
6	CA Liner Sampler, Bagged
7	Hand Auger Sample
8	CME Core Sample
9	Pitcher Sample
10	Lexan Sample
11	Vibracore Sample
12	No Sample Recovered
13	Sonic Soil Core Sample

Sampler Driving Resistance

Number of blows with 140 lb. hammer, falling 30" to drive sampler 1 ft. after seating sampler 6"; for example,

Blows/ft	Description
25	25 blows drove sampler 305 mm after initial 152 mm of seating
86/280	After driving sampler the initial 152 mm of seating, 36 blows drove sampler through the second 152 mm interval, and 50 blows drove the sampler 128 mm into the third interval
50/152	50 blows drove sampler 152 mm after initial 152 mm of seating
Ref/76	50 blows drove sampler 76 mm during initial 152 mm seating interval

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Strength Legend

Q = Unconfined Compression
u = Unconsolidated Undrained Triaxial
t = Torvane
p = Pocket Penetrometer
m = Miniature Vane

Water Level Symbols

- Initial or perched water level
- Final ground water level
- Seepages encountered

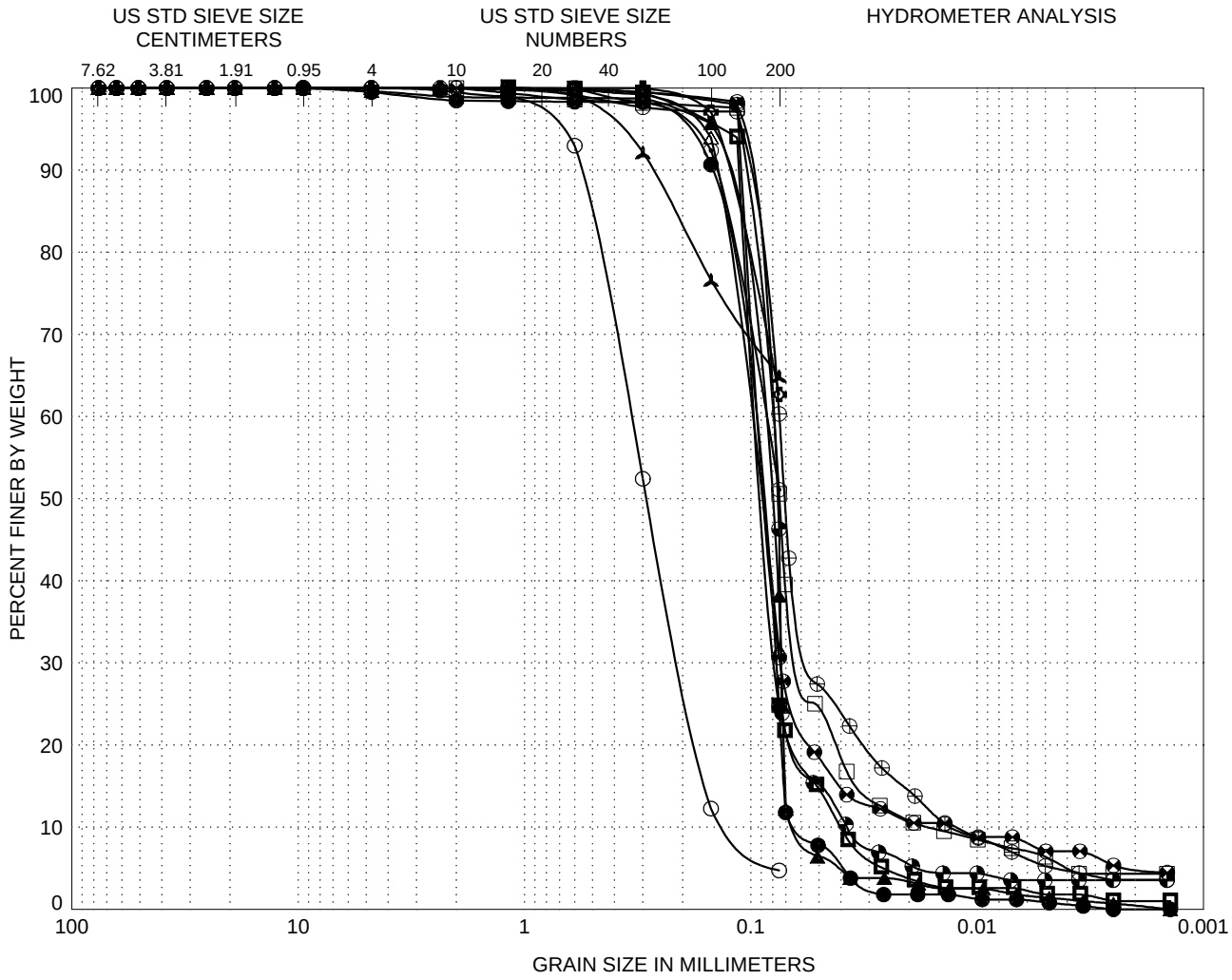
Rock Quality Designation (RQD) is the sum of recovered core pieces greater than 102 mm divided by the length of the cored interval.

KEY TO TERMS & SYMBOLS USED ON LOGS

PLATE A-3

Drop Core and Grab Sample Location	Water Depth MLLW Meters (feet)	Sample Depth Meters (feet)	Sample Description
C-03A	16.5 (54.1)	0 to 0.15 (0 to 0.5)	Silty Fine SAND (SM), gray, with shell fragments, organics, and plant material
C-04B	21.0 (68.9)	0 to 0.15 (0 to 0.5)	Silty Fine SAND (SM), gray, with shell fragments and plant material
C-06C	32.0 (105)	0 to 0.15 (0 to 0.5)	Sandy SILT (ML), gray, with shell fragments and plant material
C-08A	40.0 (131.2)	0 to 0.38 (0 to 1.25)	Sandy SILT (ML), dark gray, with shell fragments, plant material, sand pockets, and sand partings
		0.38 to 0.46 (1.25 to 1.5)	Lean CLAY (CL), very soft, very dark gray
C-10A	46.0 (151)	0 to 0.15 (0 to 0.5)	Silty SAND (SM), gray, with shell fragments and plant material

DESCRIPTIONS OF DROP CORE AND GRAB SAMPLES RECOVERED ALONG PROPOSED HDD ALIGNMENT



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

LEGEND	(location)	(depth,m)	CLASSIFICATION	Cc	Cu
○	DH-1	3.7	SAND with silt (SP-SM)	1.0	2.8
●	DH-1	9.4	Silty SAND (SM)	1.0	1.8
△	DH-1	10.7	Silty SAND (SM)		
▲	DH-1	12.5	Silty SAND (SM)	0.9	1.6
⊙	DH-1	27.4	Sandy SILT (ML)		
✿	DH-1	47.2	Fine Sandy SILT (ML)		
⅄	DH-1	52.0	Fine Sandy SILT (ML)		
◘	C-3a	0.0	Silty SAND (SM)	1.6	2.3
⊠	C-4b	0.0	Silty SAND (SM)	4.9	7.2
⊕	C-6c	0.0	Sandy SILT (ML)	3.0	5.8
□	C-8a	0.1	Sandy SILT (ML)	2.5	5.0
◒	C-10a	0.0	Silty SAND (SM)	1.7	2.3

GRAIN SIZE CURVES

BHP Cabrillo Port HDD Shore Crossing Desktop Study
Ventura County, California

PLATE A-5